REMARKS

Claims 70-72, 120-121 and 126-127 have been amended. Calims 1-69 and 80-119 were canceled without prejudice to the subject matter. Claims 70-79 and 120-130 remain pending in the application. Applicants reserve the right to pursue the original and other claims in this and other applications.

Claims 70, 120 and 123 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 5,859,450 ("Clark"). This rejection is respectfully traversed.

Claim 70, as amended, defines an imager having "an array of pixel sensor cells formed in a retrograde well on a substrate, the retrograde well being doped with a vertically graded dopant profile, wherein each pixel sensor cell has a photosensitive region and a photosensor formed at the photosensitive region; a circuit formed in the substrate and electrically connected to the array for receiving and processing signals representing an image output by the array and for providing output data representing the image; and a processor for receiving and processing data representing the image." Clark does not disclose the device of claim 70.

Clark discloses a doping gradient, however, that doping gradient is not within the pixel cell well 206, but outside of the well in the surrounding substrate 204. Clark, FIG. 2; col. 4. Specifically, the retrograde doping of Clark is provided outside the pixel at a guard ring feature 220, which surrounds the pixel. Clark, col. 4, lines 13-20. This guard ring 220 serves to isolate the pixel and reduce the dark current from wayward charge in the device. It is not a part of the charge generating pixel itself. Further, though Clark does disclose that the well 206 of the pixel cell is doped "by ion implantation of the substrate," well 206 does not possess a "vertically graded dopant profile," as recited in claim 70. Clark, col. 3, lines. 1-6. Accordingly, Clark does not anticipate claim 70. Claims 71-79 depend from claim 70 and are allowable for at least the same reasons, as well as being patentable on their own merit.

Claim 120, similar to claim 70, recites "an array of pixel sensor cells formed in a retrograde well in a substrate, the retrograde well being doped with a vertically graded dopant

concentration, wherein each of said pixel sensor cells is separated by an isolation region that electrically isolates said pixel cells from each other, and each said pixel sensor cell comprises: a photoconversion device; a reset transistor; a source follower transistor; a row select transistor; and a floating diffusion region in electrical communication with said photoconversion device and said source follower transistor." Independent claim 120 is allowable for at least the same reasons noted above in relation to the patentability of claim 70. Claims 121-130 depend from claim 120 and are also allowable for at least the same reasons, as well as on their own merit. Since each and every limitation of claims 70 and 120 and their respective dependent claims is not disclosed by Clark, these claims are not anticipated by the reference. Applicants respectfully request that the rejection of claims 70, 120 and 123 be withdrawn and the claims allowed.

Claims 71-79 and 125-130 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Clark in view of U.S. Patent 6,093,951 ("Burr"). This rejection is respectfully traversed.

As discussed above with respect to independent claims 70 and 120, Clark does not disclose "an array of pixel sensor cells formed in a retrograde well on a substrate, the retrograde well being doped with a vertically graded dopant profile." Burr does not cure this deficiency of Clark. The Office Action characterizes Burr's graded pocket region 47 as the retrograde well of claims 70 and 120. Office Action at 5-7. Even assuming the characterization were correct, which it is not, Burr's pocket region 47 is not a well. Burr's pocket region 47 is "provided in well 34 underlying the source tip region 36A and extending slightly into and under a portion of channel region 44." (Burr, col. 8, lines 1-5). Claims 70 and 120, however, require that the array of pixel sensors be formed in a "retrograde well ... with a vertically graded dopant profile." Burr's MOS device, of which the graded pocket region 47 is necessarily a part, is formed in and atop an ungraded p-type well 34. (Burr, FIGs. 1, 2; col. 8, lines 1-31). Thus, Burr does not teach or suggest "an array of pixel sensor cells formed in a retrograde well on a substrate, the retrograde well being doped with a vertically graded dopant profile."

Accordingly, as the cited combination does not disclose, teach or suggest all the elements recited in independent claims 70 and 120, claims 70 and 120 are allowable. Claims 71-79

and 125-130 depend from claims 70 and 120, respectively, and are allowable for at least the same reasons as well as their own merit. Applicants respectfully request that the rejection of claims 71-79 and 125-130 be withdrawn and the claims allowed.

Claims 122 and 124 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Clark. This rejection is respectfully traversed.

As discussed above with respect to claim 120, Clark does not disclose "an array of pixel sensor cells formed in a retrograde well on a substrate, the retrograde well being doped with a vertically graded dopant profile." Claims 122 and 124 depend from claim 120, respectively, and are allowable for at least the same reasons. Applicants respectfully request that the rejection of claims 122 and 124 be withdrawn and the claims allowed.

Claim 121 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Clark in view of U.S. Patent 6,657,665 ("Guidash"). This rejection is respectfully traversed.

As discussed above with respect to claim 120, Clark does not disclose "an array of pixel sensor cells formed in a retrograde well on a substrate, the retrograde well being doped with a vertically graded dopant profile." Guidash does not cure this deficiency of Clark. Guidash teaches transfer gates between photodiodes and floating diffusion regions but fails to disclose anything relating to retrograde wells or vertically graded dopant profiles. (Guidash, FIG. 4). Accordingly, the claimed combination does not disclose, teach or suggest "an array of pixel sensor cells formed in a retrograde well on a substrate, the retrograde well being doped with a vertically graded dopant profile," as recited in claim 120. Claim 121 depends from claim 120 and is allowable for at least the same reasons. Applicants respectfully request that the rejection of claim 121 be withdrawn and the claim allowed.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

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Respectfully submitted,

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